

DISTRIBUTION OF BURROWING OWLS ON PUBLIC AND PRIVATE LANDS IN COLORADO

TAMMY L. VERCAUTEREN,¹ SCOTT W. GILLIHAN, AND SCOTT W. HUTCHINGS
Rocky Mountain Bird Observatory, 14500 Lark Bunting Lane, Brighton, CO 80601 U.S.A.

ABSTRACT.—Burrowing Owls (*Athene cunicularia hypugaea*) in Colorado occur primarily on the eastern plains, with smaller populations in grasslands of the western and central regions of the state. As part of a regional project to conserve shortgrass prairie, we surveyed eastern Colorado for Burrowing Owls. We identified 423 Burrowing Owl locations, and received information on an additional 46 locations in parts of the state that we did not survey. Eighty percent of Burrowing Owl locations were on prairie dog (*Cynomys* spp.) colonies. Our findings reinforce the important link between prairie dog populations and Burrowing Owl populations, and the need to enlist private landowners in conservation efforts.

KEY WORDS: *Burrowing Owl*; *Athene cunicularia hypugaea*; *prairie dog*; *Cynomys ludovicianus*; *distribution*; *survey*; *private lands*; *Colorado*.

Distribución de Búhos Cavadores en terrenos públicos y privados en Colorado

RESUMEN.—Los Búhos Cavadores (*Athene cunicularia hypugaea*) en Colorado ocurren en primer lugar en las llanuras orientales, con las más pequeñas poblaciones en los pastizales de las regiones occidentales y centrales del estado. Como parte de un proyecto regional para conservar praderas de pastos cortos, examinamos el oriente de Colorado en busca de Búhos Cavadores. Identificamos 423 localidades con Búhos Cavadores, y recibimos información de 46 localidades más, en partes del estado que no estudiamos. Ochenta por ciento de las localidades del Búho Cavador estaban en colonias de perros de la pradera (*Cynomys* spp.). Nuestros hallazgos reforzaron el importante lazo entre las poblaciones de perros de la pradera y las del Búho Cavador, y la necesidad de enrolar terratenientes privados en los esfuerzos de conservación.

[Traducción de Victor Vanegas y César Márquez]

The Western Burrowing Owl (*Athene cunicularia hypugaea*) is listed as Endangered in Canada, Threatened in Colorado, and a Sensitive Species in U.S. Forest Service Region 2, which includes Colorado. The geographic center of the Burrowing Owl breeding range is Colorado (Wellicome and Holroyd 2001), where populations are concentrated on the eastern plains, with smaller populations in south-central and west-central sections of the state (Andrews and Righter 1992, Jones 1998). Historical records are sparse, but Burrowing Owls were formerly common locally on the prairies of eastern and western Colorado (Bailey and Niedrach 1965). Accurate population estimates and trends for Burrowing Owls are lacking (Robbins et al. 1986), but over half of the state and provincial wildlife agencies with jurisdiction within the range of the Burrowing Owl recently reported declining populations, and none reported an increasing pop-

ulation (James and Espie 1997). The only long-term data set available for Colorado, the Breeding Bird Survey, shows no statistically significant trend for the entire period that the survey has been run, 1966–99 ($P = 0.52$; $N = 35$ routes), although a significant rate of increase (10.31% per yr) is apparent for more recent periods (1985–98; $P = 0.03$; $N = 33$ routes; J.R. Sauer et al. 2000).

Approximately 40% of the historical shortgrass prairie in Colorado was lost by 1970 (Colorado Division of Wildlife unpubl. data). Habitat loss for Burrowing Owls continues statewide, with human development estimated to convert 17 637 ha/yr between 1990–2020, based on projected population growth (Hobbs and Theobald 1998). Populations of Burrowing Owls have been extirpated from much of the heavily-populated Front Range, which lies at the base of the eastern foothills (Niedrach and Rockwell 1939, Bailey and Niedrach 1965). Owl populations in counties east of the foothills are less threatened by urban expansion, but loss of

¹ E-mail address: tammy.vercauterer@rmbo.org

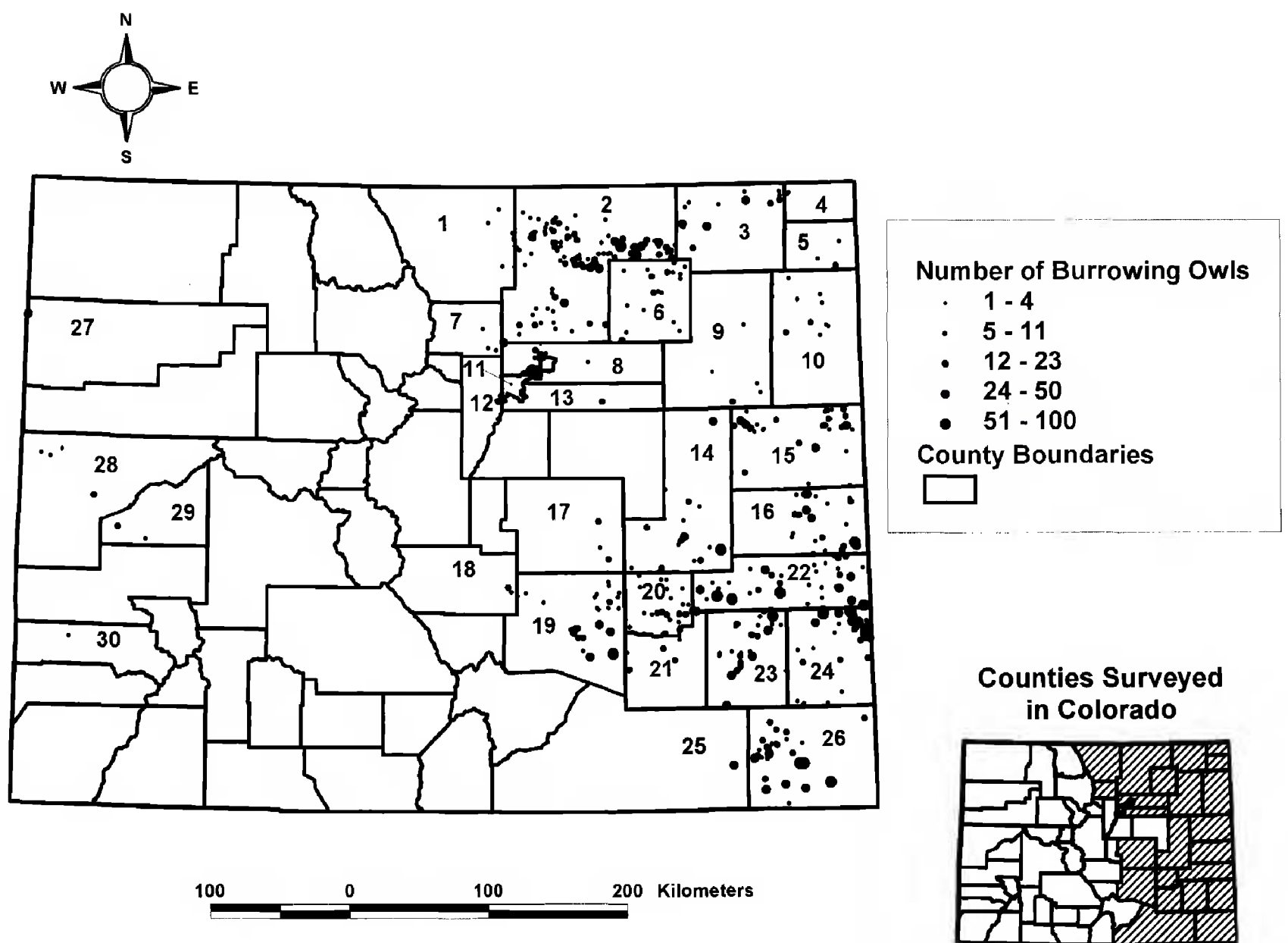


Figure 1. Burrowing Owl numbers and distribution in Colorado, 1999, as determined by the Rocky Mountain Bird Observatory Prairie Partners Project. Counties: 1 = Larimer, 2 = Weld, 3 = Logan, 4 = Sedgwick, 5 = Phillips, 6 = Morgan, 7 = Boulder, 8 = Adams, 9 = Washington, 10 = Yuma, 11 = Denver, 12 = Jefferson, 13 = Arapahoe, 14 = Lincoln, 15 = Kit Carson, 16 = Cheyenne, 17 = El Paso, 18 = Fremont, 19 = Pueblo, 20 = Crowley, 21 = Otero, 22 = Kiowa, 23 = Bent, 24 = Prowers, 25 = Las Animas, 26 = Baca, 27 = Rio Blanco, 28 = Mesa, 29 = Delta, 30 = San Miguel.

habitat to cultivation, ranchette development, and widespread control of prairie dogs (*Cynomys* spp.) still pose threats.

Throughout much of their range, western Burrowing Owls are closely associated with prairie dog colonies, which provide nesting and foraging habitat (Haug et al. 1993). Black-tailed prairie dogs (*Cynomys ludovicianus*) may have occupied as much as 1 860 000 ha in Colorado before settlement by European-Americans, but their range had declined by the late-1970s to an estimated 36 000 ha, a decline of 98% (W. Van Pelt, Arizona Game and Fish Dept. publ. comm.). Colorado state wildlife laws currently classify the prairie dog as a small game species; hunting is allowed year-round with no bag or possession limits, and landowners are allowed to

use chemical or other means to control prairie dogs on their lands (W. Van Pelt, Arizona Game and Fish Dept. publ. comm.). Regulations that take effect in September 2001 will prohibit sport hunting of black-tailed prairie dogs in eastern Colorado, but landowners will still be allowed to control prairie dogs that they perceive are damaging their land.

In 1998, Rocky Mountain Bird Observatory (RMBO) initiated the Prairie Partners Program, with the primary objectives of identifying important habitat for shortgrass-prairie birds and developing long-term voluntary conservation agreements with private landowners. As part of the Prairie Partners Program, we surveyed eastern Colorado for Burrowing Owls.

METHODS

We surveyed for Burrowing Owls east of the foothills in Colorado (Fig. 1) from 15 April–31 August 1999. Most surveys were conducted between 1 May–31 July. This period covered the breeding season for Burrowing Owls in Colorado (Jones 1998). We surveyed private land, state wildlife and recreation areas, state land board sections, and federal lands where Burrowing Owls were not surveyed by natural resource agencies. We used roadside surveys to locate owls, with efforts concentrated on prairie dog colonies and other Burrowing Owl habitats (e.g., mid-grass and shortgrass prairie). The use of roadside surveys, rather than more intensive methods, allowed us to conduct broad-scale surveys of eastern Colorado within a single breeding season.

Because Burrowing Owls are active during the day, as well as the night (Haug et al. 1993), we surveyed from sunrise until mid-morning and late-afternoon until sunset. We drove roads at moderate speeds, 50–65 km/hr, typically with one observer per vehicle. We did not survey when winds exceeded 30 km/hr or when it was raining. While driving, we scanned the area visible from the road for prairie dog colonies, mid-grass and shortgrass prairie, and owls. We also scanned fence posts and utility poles for perched owls. If owls or any burrows were observed, we stopped and scanned the area with binoculars or spotting scopes. We monitored the area for 10–15 min to count owls (adults and young-of-the-year), and recorded the maximum number seen, taking care not to double-count individuals. We marked owl locations on maps, and used Global Positioning System receivers to collect location data for uploading to a Geographical Information System (GIS) database. We also recorded the occurrence of prairie dogs and the land-ownership category.

We used a land-ownership layer for the state of Colorado (Natural Diversity Information Source 2000) in ArcView GIS (Environmental Systems Research Institute Inc. 1996) to determine how much area was owned by different entities within the state. We only quantified area of land by ownership for the counties occupied by Burrowing Owls.

We supplemented our data with additional information on owl locations from the Colorado Division of Wildlife, Rocky Mountain Arsenal National Wildlife Refuge, Pawnee National Grasslands, Comanche National Grasslands, Chatfield State Park, the Colorado Natural Heritage Program, Rocky Mountain Bird Observatory's *Monitoring Colorado's Birds* project, Prairie Partners Program cooperators, and amateur birders. We often revisited these areas to confirm Burrowing Owl sightings.

RESULTS

Fourteen people, including RMBO staff and volunteers, surveyed for Burrowing Owls in eastern Colorado for >2000 hr in total. This estimate does not include time spent by biologists and amateur birders who provided additional sightings. We identified 423 Burrowing Owl locations in eastern Colorado, and our cooperators identified an additional 46 owl locations in areas that we did not survey (Table 1, Fig. 1). These results do not in-

Table 1. Land-ownership categories for known Burrowing Owl locations in Colorado, 1999.

LAND OWNERSHIP	NO. OF OWL LOCATIONS	PERCENT OF TOTAL
Private	372	79.3
State land board	33	7.0
U.S. Forest Service National Grasslands	32	6.8
U.S. Dept. Interior Bureau of Land Management	10	2.0
Other federal	8	1.7
City	6	1.3
County	5	1.1
State	3	0.6

clude Fort Carson military base, Montezuma County, South Park, North Park, and the San Luis Valley, where owl locations had been documented previously (Jones 1998); no counts have been conducted recently in these areas. Most owl locations (79.3%) were on private lands (Table 1). Owl locations were distributed unevenly across counties (Fig. 1, Table 2). Eighty percent of Burrowing Owl locations were on prairie dog colonies.

DISCUSSION

Our surveys were conducted from the arrival of owls in spring until young were ready to fledge, so areas surveyed early in the season, when young were not yet visible above ground, had lower owl counts than those late in the season. Thus, we could not compare numbers of owls observed across the breeding season, and have presented information on owl counts primarily to show owl distribution (Fig. 1).

Weld County had the greatest number of Burrowing Owl locations (Table 2). Weld was the largest county surveyed and ranked third for total area of grassland among eastern Colorado counties (Colorado Division of Wildlife unpubl. data). Also, Weld ranked second for area of active black-tailed prairie dog colonies in eastern Colorado (Colorado Division of Wildlife unpubl. data).

Burrowing Owls exhibit a close association with prairie dog colonies, which provide nesting and foraging habitat (Haug et al. 1993). Prairie dog alarm calls may facilitate more effective predator detection by Burrowing Owls, and prairie dogs may serve as an alternative prey for predators, helping reduce the risk of predation on Burrowing Owls

Table 2. Distribution of known Burrowing Owl locations by county in Colorado, 1999.

COUNTY	OWL LOCATIONS	PERCENT OF OWL LOCATIONS
Adams	11	2.3
Arapahoe	1	0.2
Baca	29	6.2
Bent	26	5.5
Boulder	3	0.6
Cheyenne	23	4.9
Crowley	24	5.1
Delta	2	0.4
Denver	3	0.6
El Paso	3	0.6
Fremont	2	0.4
Jefferson	1	0.2
Kit Carson	32	6.8
Kiowa	37	7.9
Las Animas	1	0.2
Larimer	9	1.9
Lincoln	17	3.6
Logan	16	3.4
Mesa	4	0.8
Morgan	18	3.8
Otero	8	1.7
Phillips	3	0.6
Prowers	33	7.0
Pueblo	33	7.0
Rio Blanco	1	0.2
San Miguel	1	0.2
Sedgwick	2	0.4
Washington	5	1.1
Weld	111	23.7
Yuma	10	2.1

(Desmond et al. 2000). Burrowing Owls often distribute broods among several burrows within a prairie dog colony, making it less likely to lose an entire brood to predation (Desmond and Savidge 1999). Because of these relationships, any effective conservation strategy for Burrowing Owls in the state must address conservation of prairie dogs.

Our sampling did not yield an accurate estimate of the total Burrowing Owl population in Colorado, but identified hundreds of Burrowing Owl locations, many of which had not been documented previously. This study helps fill the gap in information that exists on private lands and establishes a baseline upon which future studies and management can build. It also helps state and local officials, resource managers, and researchers gain a

better understanding of the Burrowing Owl population and its distribution within Colorado.

Because the vast majority (79.3%) of owl locations in this study were on private lands, a long-term approach that promotes prairie stewardship on private lands appears to be key for Burrowing Owl protection. Burrowing Owl conservation can be enhanced through programs such as Prairie Partners, which asks private landowners for their voluntary cooperation to protect shortgrass prairie birds and their habitat (Skeel et al. 2001). The state land board and the U.S. Forest Service National Grasslands supported the second highest number of owl locations in this study. State land board sections generate revenue for public education, primarily through agricultural leases to the private sector for grazing and crop production, and also through mineral development. Because state land board lands are managed by private leasees, private landowners and the Forest Service are the most important stewards of Burrowing Owl habitat in Colorado. Given that the National Grasslands are interspersed with private parcels, cooperative management between the Forest Service and private landowners would encourage management of the areas as comprehensive units, rather than separate, fragmented parcels. Such cooperative land management would undoubtedly enhance Burrowing Owl conservation.

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